

# Fine Bubble Aeration for Existing & New Lagoons in Illinois



# ADS Bio

- ⑥ 3 Generations Water & Wastewater consultant at
- ⑥ Air Diffusion Systems: Father, Son and Grandson
- ⑥ Established in 1965 (formerly Hinde Engineering Co.)
- ⑥ Manufacturer of fine bubble aeration for both water and wastewater treatment
  - ⑥ 1,000 domestic / industrial wastewater systems
  - ⑥ 4,000 reservoir, lake, aquaculture, marina, & ice melting systems



# Municipal Wastewater

## Constituents

-  Water
-  Organics
-  Inorganics
-  Nutrients
-  Other

## Tests

-  Flow
-  BOD & TSS
-  pH
-  Nutrients
-  Other

# Keys To Wastewater Treatment

- ⑥ 1) Quantify 2) Analyze 3) Implement
- ⑥ Maintain ecological balance
- ⑥ Pretreatment is critical (no inorganics)
- ⑥ Understand oxygenation & mixing goals
- ⑥ Design for the future using efficient technologies
- ⑥ Complete system approach
- ⑥ Evaluate & incorporate nutrient removal & recirculation
- ⑥ Measure sludge every 3 – 5 years & have a mitigation plan in place

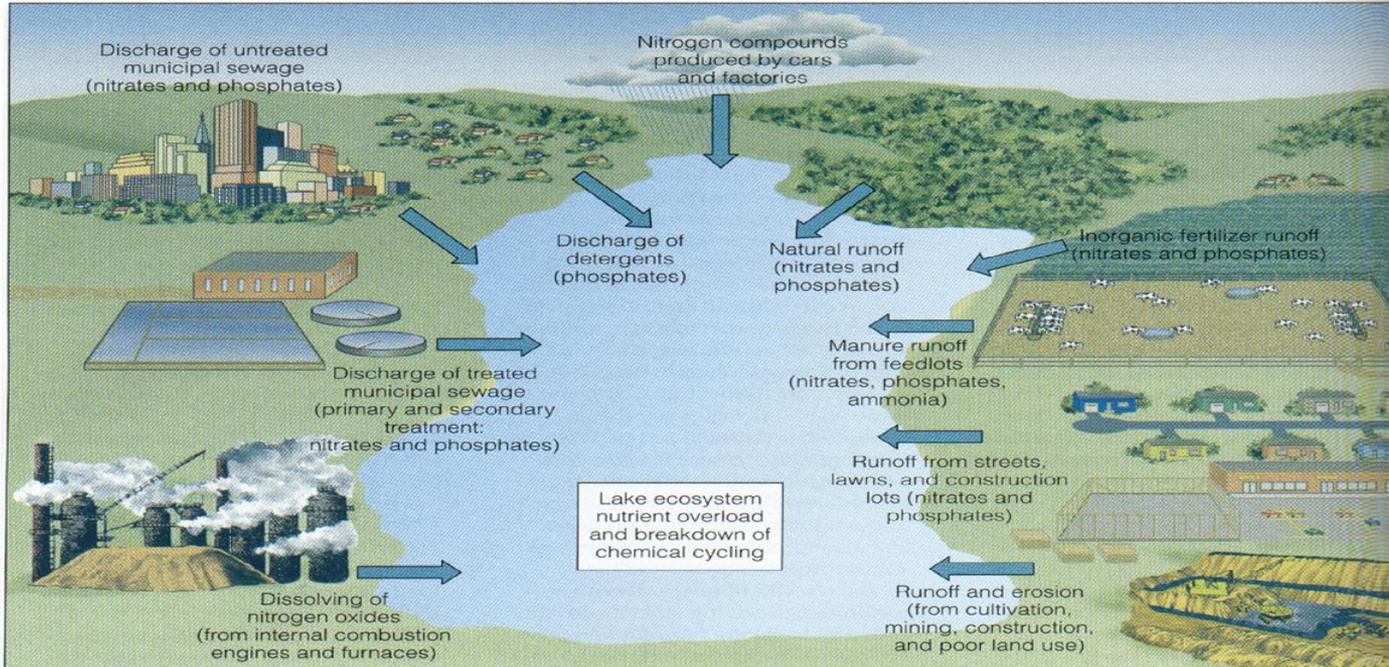


# Wastewater Treatment “Factors”

- ⑥ Water Temperature
- ⑥ pH / Alkalinity
- ⑥ Dissolved Oxygen
- ⑥ Retention Time
- ⑥ CNP Ratios & Trace Elements
- ⑥ Wastewater Biochemistry
- ⑥ Wastewater Microbiology
- ⑥ Pre-treatment & Sludge



# For Thousands Of Years, Wastes Have Been Disposed Into Convenient Water Ways, Mainly Rivers



**Figure 20-6** Principal sources of nutrient overload causing cultural eutrophication in lakes. The amount of nutrients from each source varies according to the types and amounts of human activities occurring in each airshed and watershed. Levels of dissolved oxygen (Figure 20-3) drop when enlarged populations of algae and plants (stimulated by increased nutrient input) die and are decomposed by aerobic bacteria. Lowered oxygen levels can kill fish and other aquatic life and reduce the aesthetic and recreational values of the lake.

# The Origin Of Stabilization Ponds

A  
Reader's Digest  
REPRINT

## Nature's Wondrous Way With Waste

DON ROMERO

Assistant professor, School of Journalism,  
University of Missouri

Condensed from *National Civic Review*

**S**INCE 1956, government officials from Washington, technicians from virtually every state in the Union and even visiting scientists from Europe and Latin America have been journeying to the little town of Fayette, Mo.—to take a long and incredulous look at a pond. Fayette's 3100 citizens are justifiably proud of their 15-acre lagoon. It has unfailingly provided them with seemingly miraculous benefits, and it has been officially selected by the U. S. Public Health Service for a five-year study.

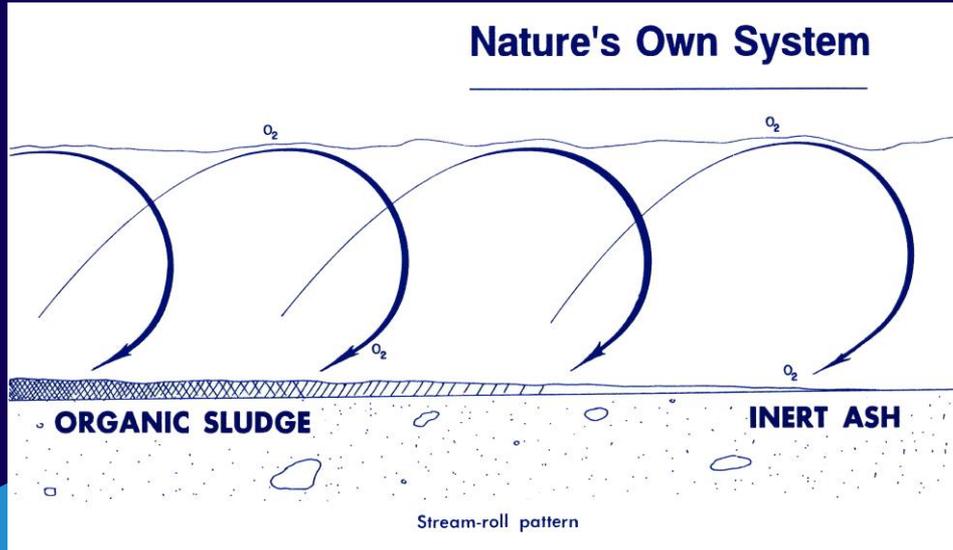
Day and night for the last four years all the sewage from the town of Fayette has poured into this three-foot-deep pond. Although no chemical or mechanical means has ever been used to purify the sewage, the pond has remained odorless and clear blue-green in color. The efflu-

ent, as shown by daily analysis, achieves a high degree of purification. Frogs and turtles live in the water, and loons and geese come there for refuge.

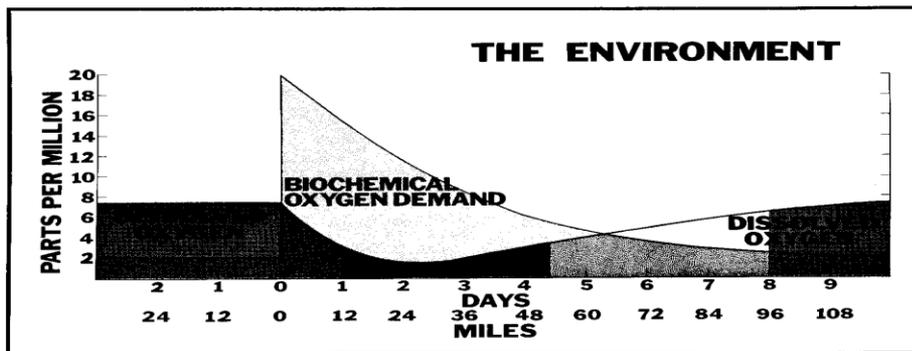
The secret of the Fayette pond lies in the recent rediscovery of one of nature's oldest wonders—a method of purifying sewage that is simple, safe and inexpensive. "With our modern technology," says one public-health official, "we tend to think that we can purify sewage only with costly and complicated mechanical installations. The fact is, nature can do an excellent job on everything except certain kinds of synthetic industrial wastes."

Nature's agents are worms, snails, bacteria and algae. When sewage enters a "sewage stabilization lagoon," the solids drop to the bottom, where they are promptly disposed

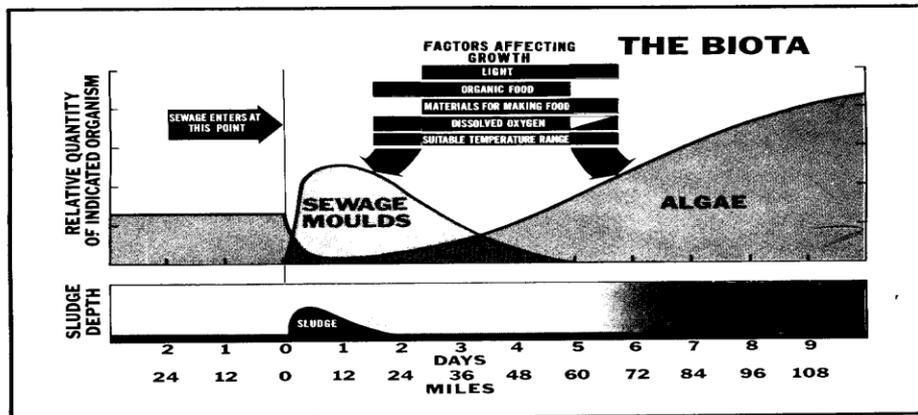
# The Original Wastewater Treatment System: "The Rolling River"



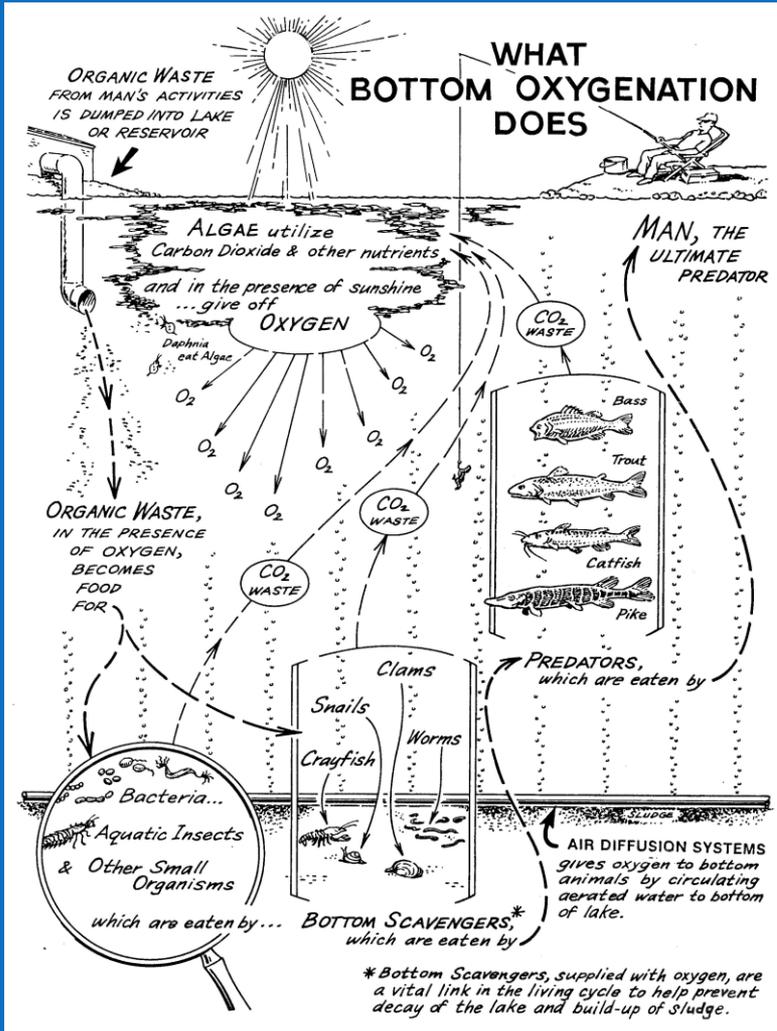
# Waste Is Dumped Into A River, It's Treated Biologically For Miles Downstream



The assumptions in the hypothetical pollution case under discussion are a stream flow of 100 cfs, a discharge of raw sewage from a community of 40,000 and a water temperature of 25°C, with typical variation of dissolved oxygen and BOD.



Shortly after sewage discharge, the moulds attain maximum growth. These are associated with sludge deposition shown in the lower curve. The sludge is decomposed algae gain a foothold and multiply.



# Natures Scavengers

*The missing link in decaying lakes: Bottom Oxygen*

*Oxygen in the bottom sludge  
is necessary for:*

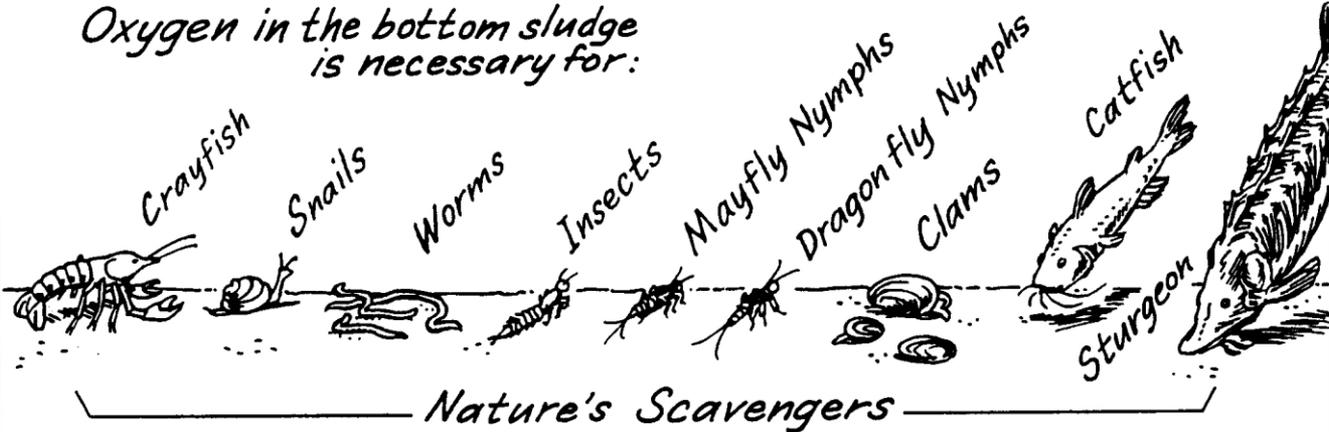


Figure 8 -- When oxygen exists along the bottom of a lake or reservoir, important biota, all bottom feeders, can live, eat and eliminate the organic sludge the natural way. Even catfish and sturgeon devour much bottom material. Catfish weigh over 100 pounds -- sturgeon over 1200 pounds -- almost all useful transformation of bottom sludge.

# Two Main Forms of Wastewater Treatment



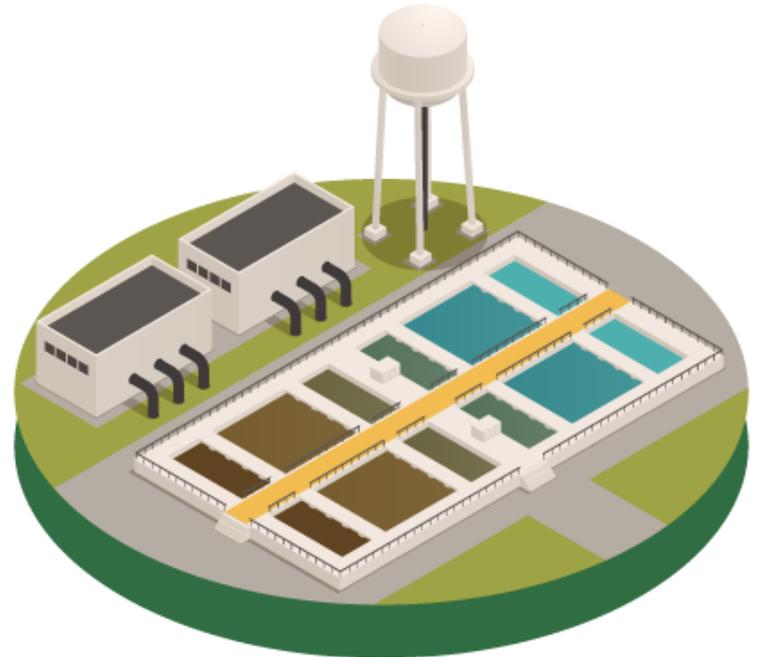
1) **Activated Sludge Processes:**  
Mechanical & chemical separation of wastes from H<sub>2</sub>O

2) **Lagoon Processes:** Natural & biological separation of wastes from H<sub>2</sub>O



## 2) Lagoon Processes

- ⑥ Natural / Biological Process
- ⑥ Large Land Requirements
- ⑥ Long Retention Times (20+ Days)
- ⑥ 0.5 # BOD / 1000 cubic feet
- ⑥ Sludge Digestion = Internal
- ⑥ Low Energy Requirements
- ⑥ ~ \$3-\$5 Per Gallon Treated
- ⑥ ADS Blower Electrical Cost Per Person can be as low as 2 cent /day



# Quiz Time: What the largest mammal on the earth?

## Big animal collection



# Blue whale

The blue whale is the largest mammal ever known to exist on Earth

BBC  
Bitesize

WEIGHT  
Over 150,000 kg



ANTARCTICA

LENGTH  
Around 33 m



LIFESPAN  
80-90 years

## FACT FILE

- Their tongue alone can weigh as much as an elephant



Tongue

- Their heart can weigh as much as a motorcycle



Heart

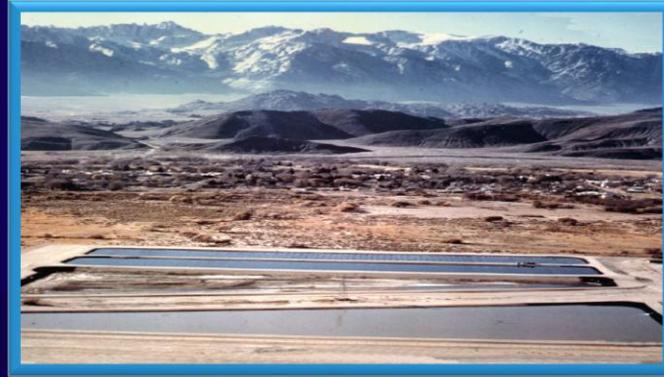
- The largest known blue whale was around 33 m



## Common Lagoon Problems

- Sludge accumulation (stored nutrients + decreased retention)
- I&I / collection system updates required
- Short circuiting (decreases retention time)
- Poor pre-treatment (flushable wipes / plastics)
- Winter / spring ammonia removal (temperature)
- Aging equipment (less efficient)
- Decreasing population, Increased \$\$\$, Increased treatment requirements

# Lagoons Come In Many Shapes & Sizes



# 4 Types of Lagoons

1

**Anaerobic**

2

**Photosynthetic**

3

**Aerated  
(Aerobic)**

4

**Aerated  
(Facultative)**

# 1) Anaerobic Lagoons

## Process

**Anaerobic  
Soluble BOD  
Conversion**

**Solids  
Digestion**

## Advantages

**50 – 60%  
BOD  
Removal**

**Low  
Operating  
Costs**

## Disadvantages

**Partial  
Treatment**

**Uncontrolled  
Odors**

## 2) Photosynthetic Lagoons

### Process

**Aerobic  
Soluble BOD  
Conversion**

**Facultative &  
Anaerobic  
Solids  
Digestion**

**Surface Area  
Load Limited**

### Advantages

**Seasonally  
High Degrees  
of Treatment**

**Low Operating  
Costs**

### Disadvantages

**Largest Land  
Requirements**

**Seasonally Poor  
Performance**

**Odors**

### 3) Aerated Aerobic Lagoons

#### Process

**Aerobic  
Soluble BOD  
Conversion**

**Modified  
Mixed Liquor  
Process**

**Complete Mix  
System**

#### Advantages

**No Settling  
Of Solids**

**No Odors**

#### Disadvantages

**Complex  
Operation**

**Sludge**

**High Energy  
Requirements**

**Expensive**

## 4) Aerated Facultative Lagoons

### Process

**Aerobic Soluble BOD  
Conversion**

**Aerobic, Facultative, &  
Anaerobic Sludge Digestion**

**Non-Mixed Liquor Process**

**Partial Mix System**

### Advantages

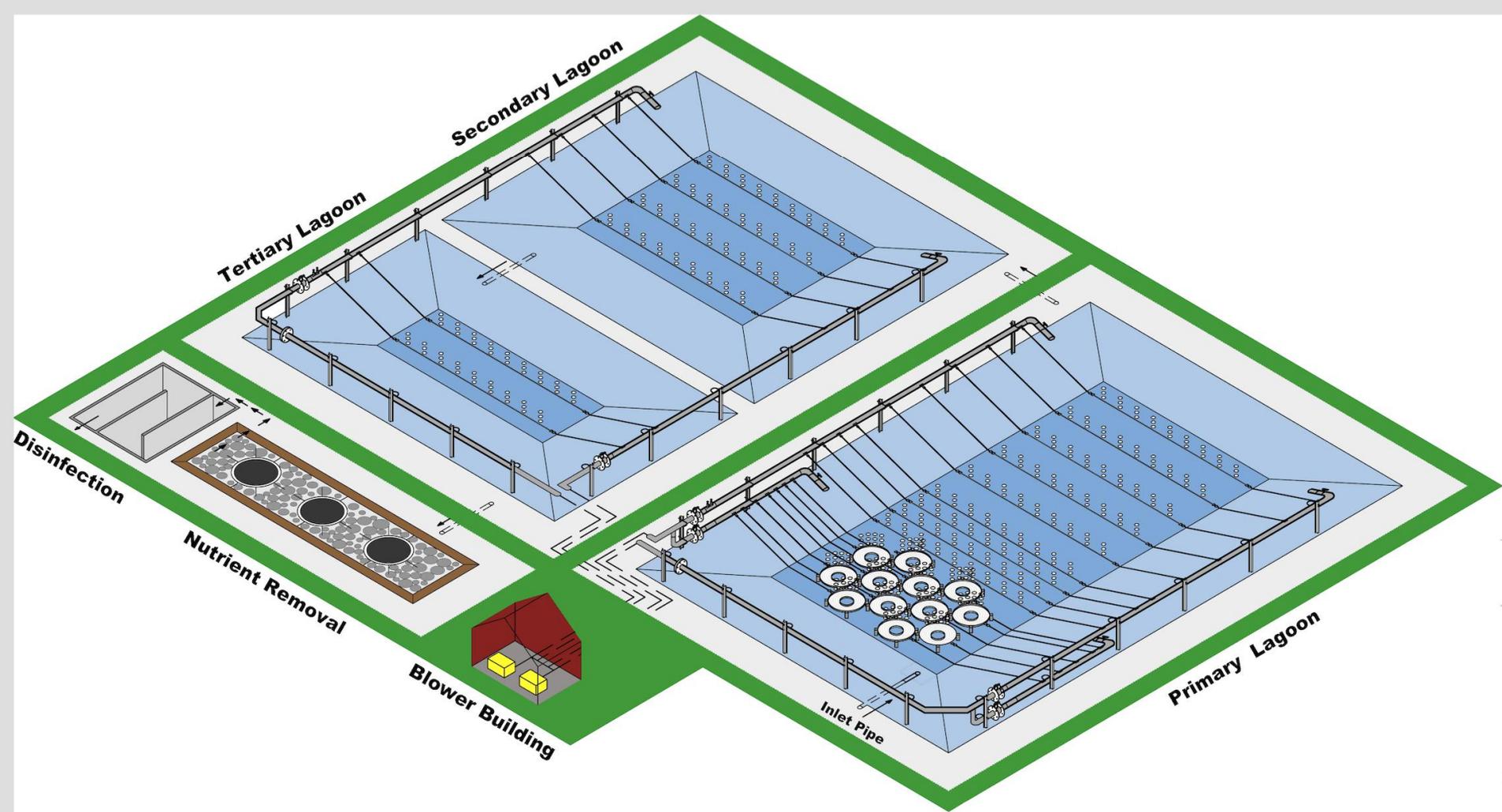
**Year-Round Treatment**

**Internal Sludge  
Digestion**

**Flow & Load  
Equalization**

**Low Energy**

**Low Maintenance**



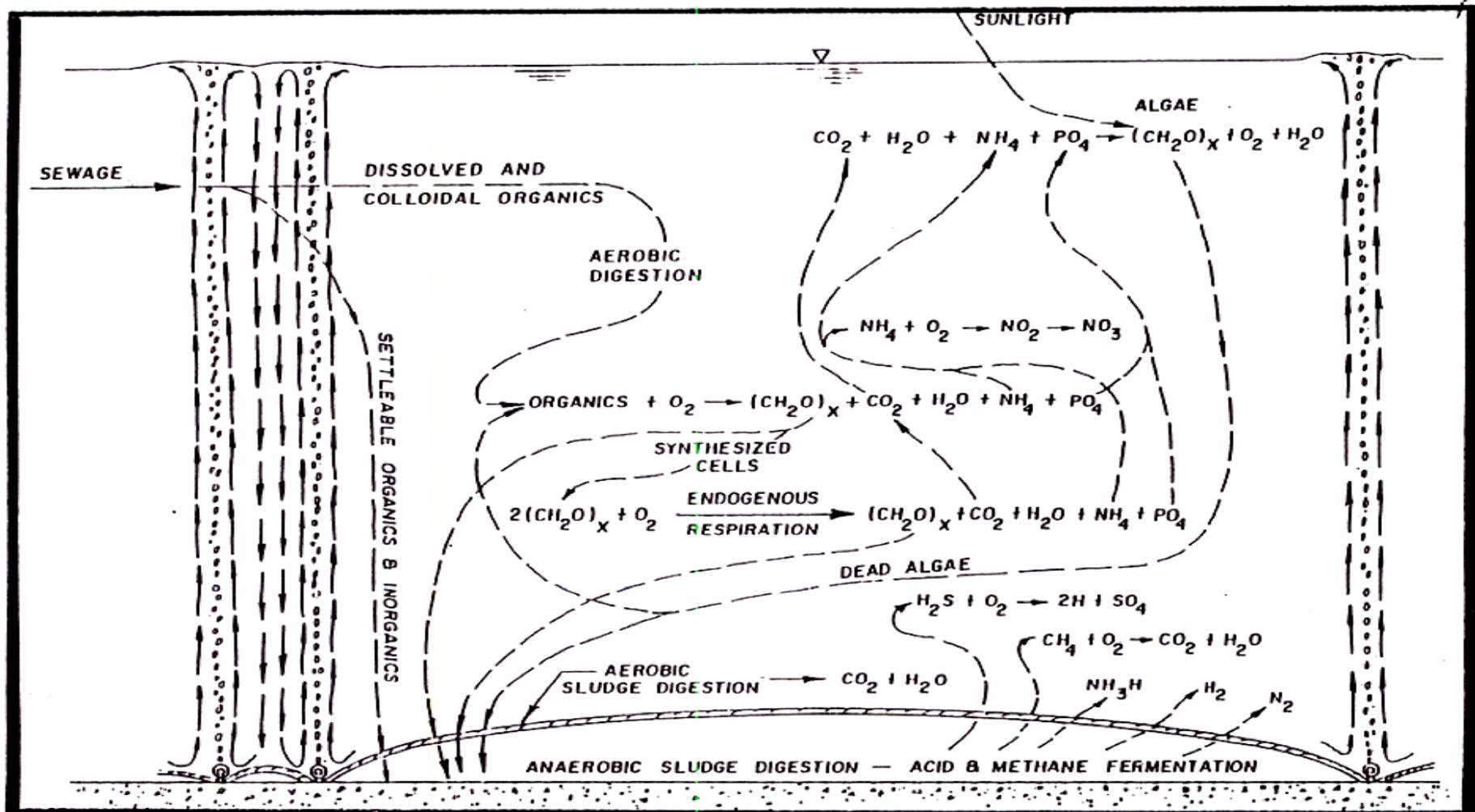
# How Does An Aerated Facultative Lagoon Work?

- ⑥ All 3 process occur in a properly oxygenated lagoon.
  - ⑥ Anaerobic
  - ⑥ Facultative
  - ⑥ Aerobic
- ⑥ When properly designed, provides efficient oxygenation and mixing
- ⑥ Handles shock flows and loads well

# Working Closely With Bacteria & Biology

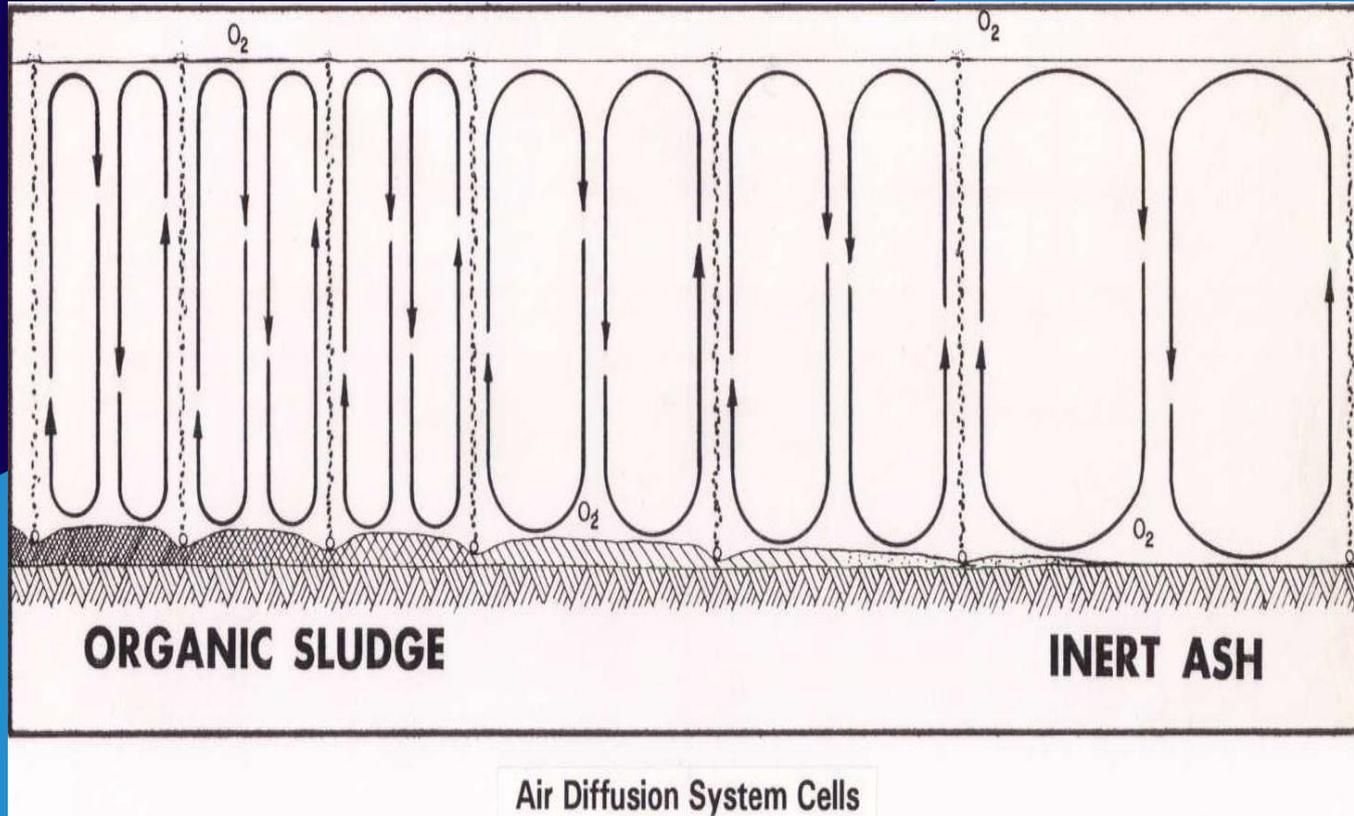
- ⑥ Duplicates water treatment similarly to a “Rolling River”.
- ⑥ Provides air at the sludge / water interface.
- ⑥ Creates aerobic conditions throughout the entire water column (2 ppm O<sub>2</sub> + no odors).
- ⑥ Digests sludge and organics internally.
- ⑥ No sludge Hauling for 20 + years.





BIOLOGICAL REACTIONS IN AERATED-FACULTATIVE LAGOON PROCESS

# Duplicates A Rolling River



# Bubble Size Matters

<b>Diameter inches</b>	<b># of Bubbles</b>	<b>Volume cu mm</b>	<b>Surface Area sq mm</b>	<b>Factor Increase</b>
<b>1</b>	<b>1</b>	<b>8,584</b>	<b>2,028</b>	<b>1</b>
<b>1/2</b>	<b>8</b>	<b>8,584</b>	<b>4,055</b>	<b>2</b>
<b>1/8</b>	<b>512</b>	<b>8,584</b>	<b>16,221</b>	<b>8</b>
<b>1/100</b>	<b>1,000,000</b>	<b>8,584</b>	<b>202,765</b>	<b>100</b>

# 3 Subcategories of Aeration Systems

## Submerged

Static  
Tubes

Jet

Coarse Bubble

Fine Bubble

## Surface

Low Speed  
Turbine

High Speed  
Floating

Aspirating

Rotor Brush /  
Rotating Disk

## Cascade

Step Aeration

# Surface & Jet Aeration

- Ideally suited for very shallow applications.
- Horsepower intensive.
- It is **VERY** difficult to force a bubble down against buoyancy & gravity!
- A very turbulent treatment process.



# Coarse Bubble Aeration

- Larger bubbles rise quickly (1-2' / sec)
- This fast rise rate and large bubble diameter creates a turbulent bubble
- Turbulent bubbles provide poor oxygenation & mixing and are also energy inefficient



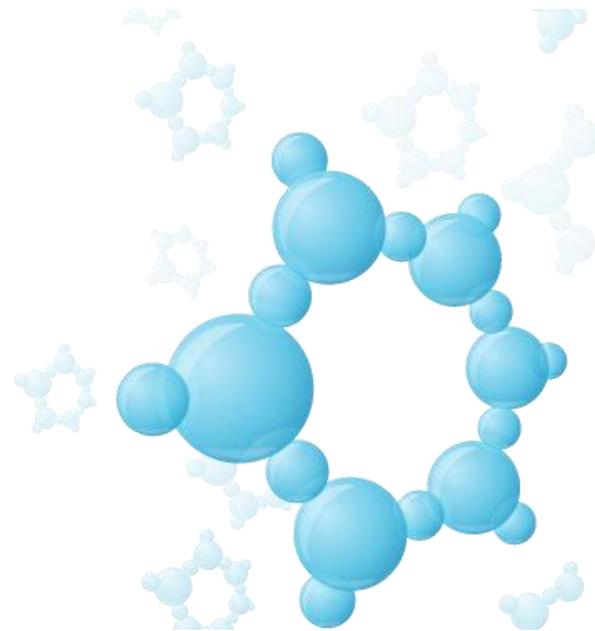
# ADS Fine Bubble Aeration

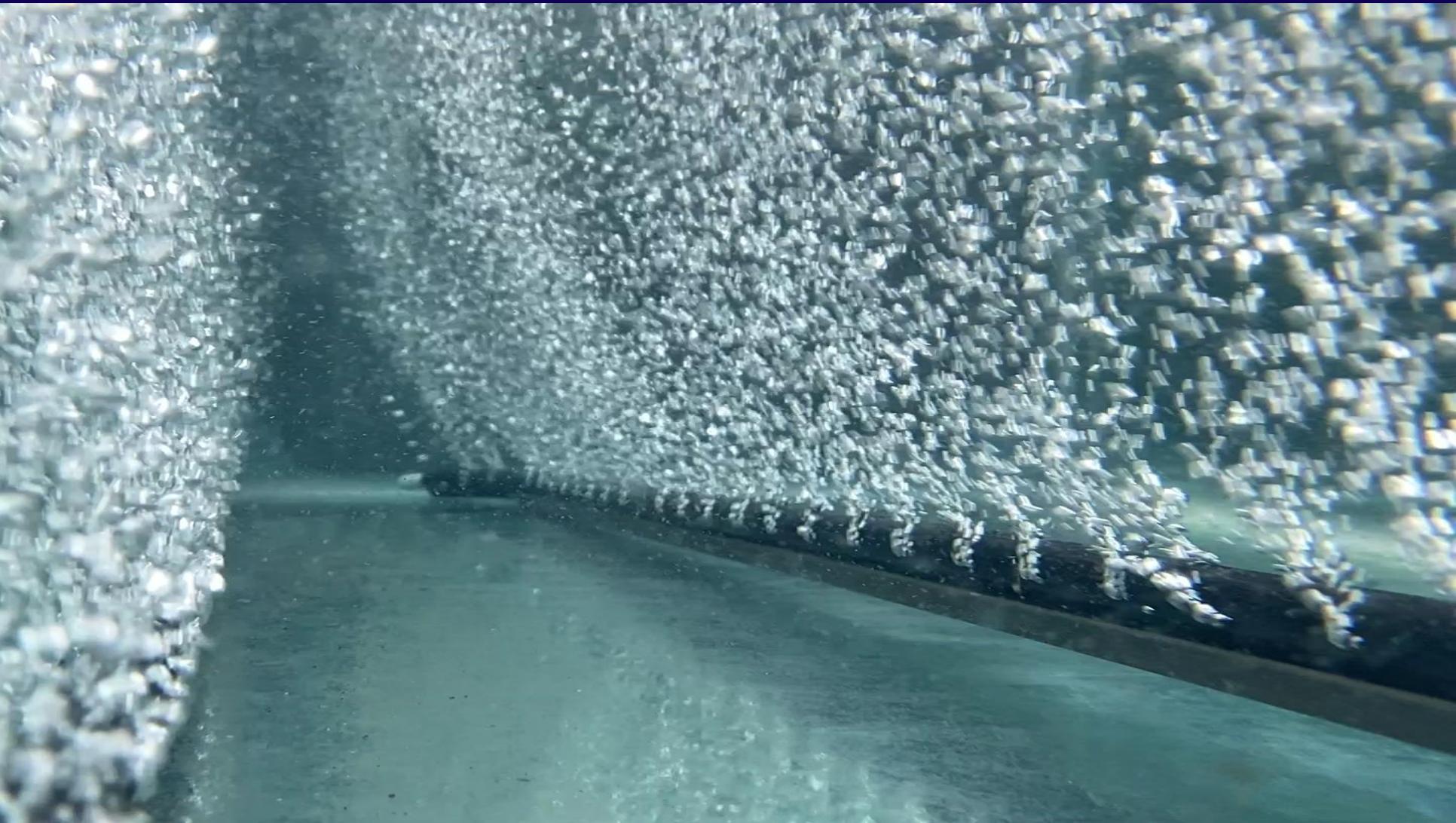
- ⑥ The vertical movement of bubbles mixes and moves oxygen throughout all levels of the water column.
- ⑥ This movement pumps dense oxygen deficient water to the surface. For every gallon of water displaced one must replace it.
- ⑥ Fine Bubble Aeration provides highly efficient oxygenation & mixing rates compared with alternative technologies.



# ADS Fine Bubble Aeration

- ⑥ Fine bubbles rise slowly (0.8' / sec).
- ⑥ This slow rate of rise creates a non-turbulent laminar flow of both air & the surrounding water.
- ⑥ A slower rate of rise allows for prolonged contact time with the water, allowing for greater O<sub>2</sub> transfer.
- ⑥ Fine bubbles have very little bubble slippage, so that nearly all the water surrounding each bubble moves with it.







# ADS Disk Module Aeration



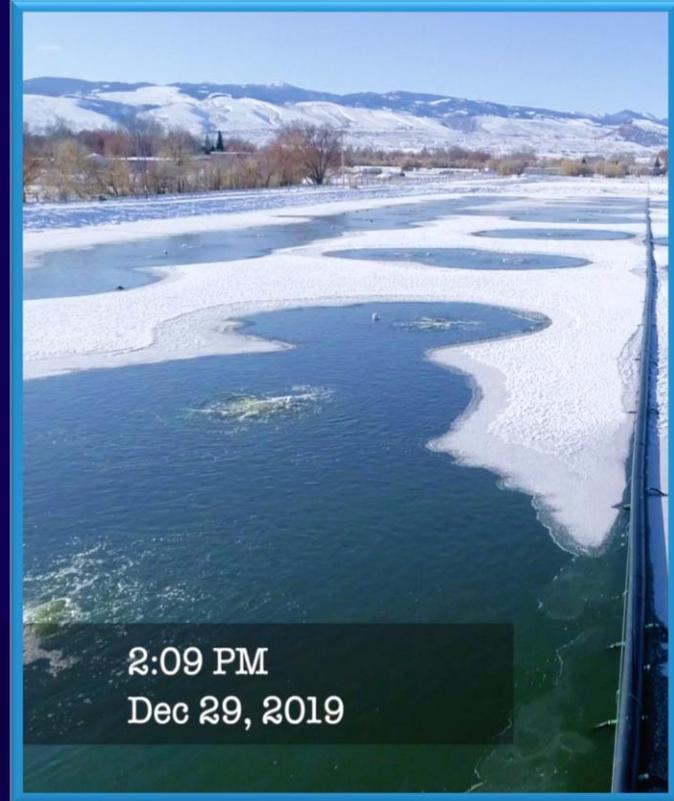
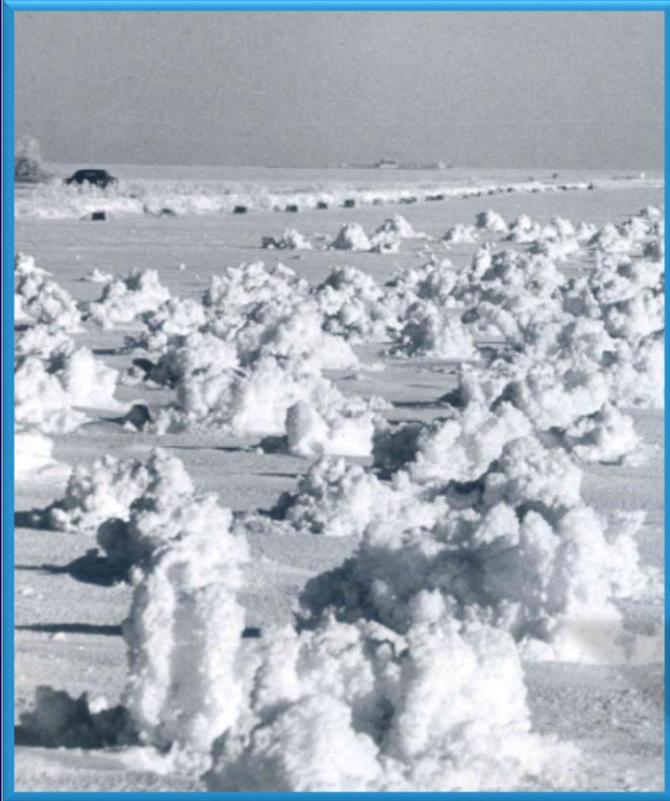
# ADS Disk Module Aeration

- ⑥ 100' of ADS fine bubble aeration tubing coiled inside of a 46" frame.
- ⑥ 1' long legs keep the disk modules suspended off the bottom.
- ⑥ A buoy and float rope allow for installation without dewatering..
- ⑥ Each "LTC" disk module contains 2,400 air releases and creates 5+ bubbles per second.
- ⑥ Nominal flow rate per "LTC" Disk module is 8 – 10 SCFM
- ⑥  $2,400 \times 5 \times 86,400 \text{ seconds} / \text{day} = 1.03 \text{ Billion bubbles}$
- ⑥ Each "LTC" disk module mixes 1.72 MG / foot of water depth.



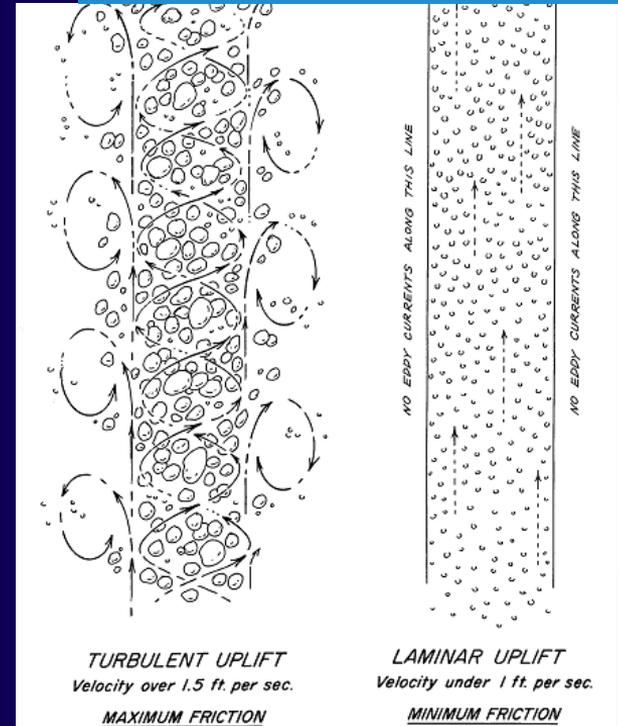


# Fine Bubble Aeration Winter Operation



# Mixing: Laminar vs. Turbulent Flow

- Both bubble diameter and rise rate effect how a bubble moves through water and its ability to efficiently LIFT water to the surface.
- This movement provides the necessary mixing in order to disperse oxygen between any two diffusers.
- Laminar bubbles provide more efficient mixing and circulation than turbulent bubbles.
- This difference can be calculated mathematically using a fundamental principle of fluid dynamics known as “Reynolds Number” (Re #).
- Bubble diameter is characterized as laminar for  $Re < 2,100$  and fully turbulent for  $Re > 10,000$ .



# 3 Types of Blowers

## Dual-Lobe

Least  
Expensive

Lowest  
Efficiency

## Tri-lobe

More  
Expensive

More  
Efficient

## High Speed Screw / Turbo

Most  
Expensive

Most  
Efficient

# Which Blower Should You Choose?

- For blowers 5 –15 HP, use a Dual Lobe or Tri Lobe
- For blowers 20 – 40 HP, use a Tri Lobe.
- For blowers with 40 HP+ use a High-Speed Screw Type
- Direct drive blowers are better than belt driven blowers
- Use a VFD to save on electrical
- Use a remote control & monitoring device for ease of O&M



# How To Properly Size A Blower

- Take Water Depth x 0.433 – Let's Assume 10' WD:
- $10 * 0.433 = 4.3 \text{ PSI}$
- + 3 PSI For Friction Loss & Diffuser Back Pressure:
- $4.33 + 3.0 = 7.33 \text{ Normal Operation}$
- + 5 PSI for Diffuser Fouling & Water Purging
- $7.33 + 5 = 12.33 \text{ Maximum Pressure / PRV Setting}$
- Don't Be Afraid To Go Up A Motor Size!!

# Illinois Installed Fine Bubble Systems



## 1975 (Upgrade 2019) Village of Hamel, IL

ADS 3 Cell Aerated Lagoon  
followed by Aerated Rock Filter  
& Sand Filter to meet stream  
discharge limits



## 1999 (Upgrade 2025) City of Williamsfield, IL

ADS 2 Cell Aerated Lagoon  
System followed by Aerated  
Rock Filter



**2002**  
**City of Columbia, IL**

Advanced Microbial Treatment System (AMTS) Improves Shallow Lagoon Performance



**2003 (Upgrade 2024)**  
**City of Woodson, IL**

ADS Aerated-Facultative lagoon with Aerated Rock Filter ready to meet single digits limits



**2007 (Upgrade 2026)**  
**Worden, IL**

Upgraded existing ADS system with LTC disk diffusers in one lagoon for an easier to clean system.



**2009 (Upgrade 2026)**  
**Odell, IL**

ADS 2 Aerated Lagoon System converted from large non-aerated lagoon into smaller aerated lagoons to reduce power and meet new limits



**2013**  
**Gridley, IL**

ADS Aerated Lagoon System  
with floating header and  
diffuser modules to meet  
combined industrial and  
domestic waste loads



**2013**  
**St. Jacob, IL**

ADS 2 Aerated Lagoon  
System to upgrade inefficient  
old aeration with Intermittent  
Sand Filter



**2014**  
**Bunker Hill, IL**

ADS Aerated Lagoon and Aerated Rock Filter System to ensure new treatment limits, including ammonia reduction



**2015**  
**Clay City, IL**

ADS 2 Aerated Lagoon System followed by Aerated Rock Filter System, beneficial bacteria, and phosphorus reduction treatment



**2015**  
**Dieterich, IL**

ADS installation of 3,700 feet of LWA1.5 aeration tubing, resulting in fluid turnovers every 38 minutes.



**2015**  
**Forreston, IL**

ADS 2 Aerated Lagoon System with Floating Header to replace coarse bubble diffusers



**2015**  
**Georgetown, IL**

ADS 2 Aerated Stormwater Retention Lagoon System to hold excess water prior to discharge



**2015**  
**Goodfield, IL**

ADS 2 Aerated Lagoons System followed by Aerated Rock Filter to meet BOD, TSS, and ammonia limits



**2015**  
**Round Lake S.D., IL**

ADS Aerated Stormwater Retention System to prevent stagnation, odors, and Harmful Algal Blooms



**2016**  
**Sigel, IL**

ADS 2 Aerated Lagoon System to meet new effluent limits with reduced energy consumption



**2017**  
**Dalton City, IL**

ADS installation of 16 LTC disk diffusers across 3 lagoons, resulting in improved performance to meet treatment needs.



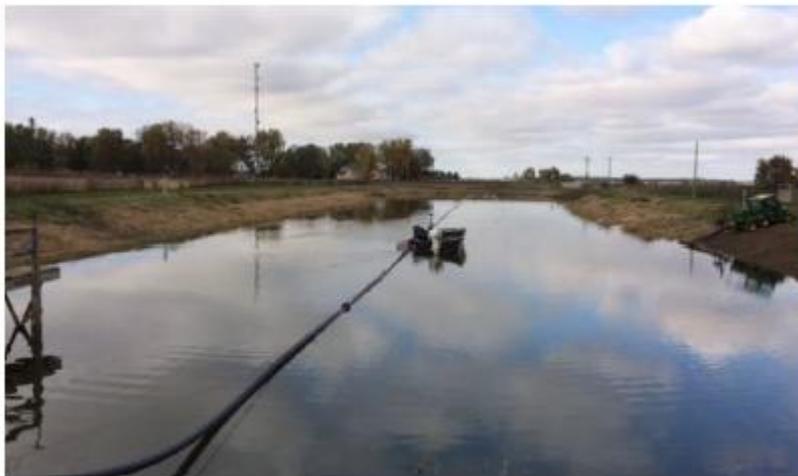
**2018**  
**Minonk, IL**

ADS replacement of old system, including 71 LTC disk diffusers and 8 lines of aeration tubing across 2 lagoons, resulting in more than 67% power savings.



**2019**  
**Annawan, IL**

ADS installation into existing lagoon and 26 total LTC disk diffusers, resulting in less than half of the maximum BOD limit.



**2019**  
**Chapin, IL**

ADS installation of 17 LTC disk diffusers laid out on a floating header.



**2019**  
**Fairbury, IL**

ADS Aerated Lagoon System  
with 2 Floating Headers to  
meet future limits



**2020**  
**Bureau Junction, IL**

ADS Aerated Lagoon System  
Replacing Static Tubes with  
Fine Bubble



**2020**  
**Industry, IL**

ADS installation of 17 LTC disk diffusers, resulting in single digit BOD outputs.



**2020**  
**Spring Valley, IL**

90 HP surface aerators replaced with 15 BHP ADS Fine Bubble Aeration. The city received a \$70,000 check for power saving funds by the electric supplier.



**2021**  
**Lanark, IL**

Static Tube Replacement to  
Fine Bubble Aeration ADS 2  
Aerated cells followed by two  
sand filters to meet surface  
discharge limits and eliminate  
odors



**2021**  
**Oneida, IL**

Static Tube inefficient  
Aeration replaced with ADS  
very efficient Aeration three  
Aerated cells and filter to  
meet new effluent limits.



**2022**  
**Gifford, IL**

24 LTC disk diffusers were installed to mix the two lagoons at a less than 20 minute fluid turnover rate.



**2022**  
**Highland Hills, IL**

In the process of ADS conversion from static tubes to fine bubble aeration.



**2022**  
**Neoga, IL**

ADS installation process of HDPE fusion and diffuser installation with MBBR process to remove ammonia.



**2022**  
**New Berlin, IL**

ADS Installation with 3 Blower and VFD Controls two Aerated cells and filter to meet new effluent limits.



**2022**  
**Waterman, IL**

ADS conversion from their old aeration system to the new ADS fine bubble system after the sludge was removed.



**2023**  
**Eldon Hazlet State Park, IL**

ADS installation providing 16 LTC disk diffusers across 2 lagoons, and 500 feet of LWA1.5 aeration tubing in an aerated rock filter.



**2023**  
**Lostant, IL**

ADS installation of 12 LTC disk modules and 5 LWA disk modules, resulting in single digit BOD output.



**2023**  
**South Wilmington East**  
**Brooklyn, IL**

ADS installation of 20 LTC Diffuser disks in 2 lagoons, resulting in high mixing and oxygen delivery rates.



**2024**  
**Alpha, IL**

ADS installed 18 LTC disk diffusers across a 2-cell lagoon, replacing old static diffuser tubing.



**2025**  
**Nokomis, IL**

Two aerated lagoons with aerated rock filters for ammonia removal.

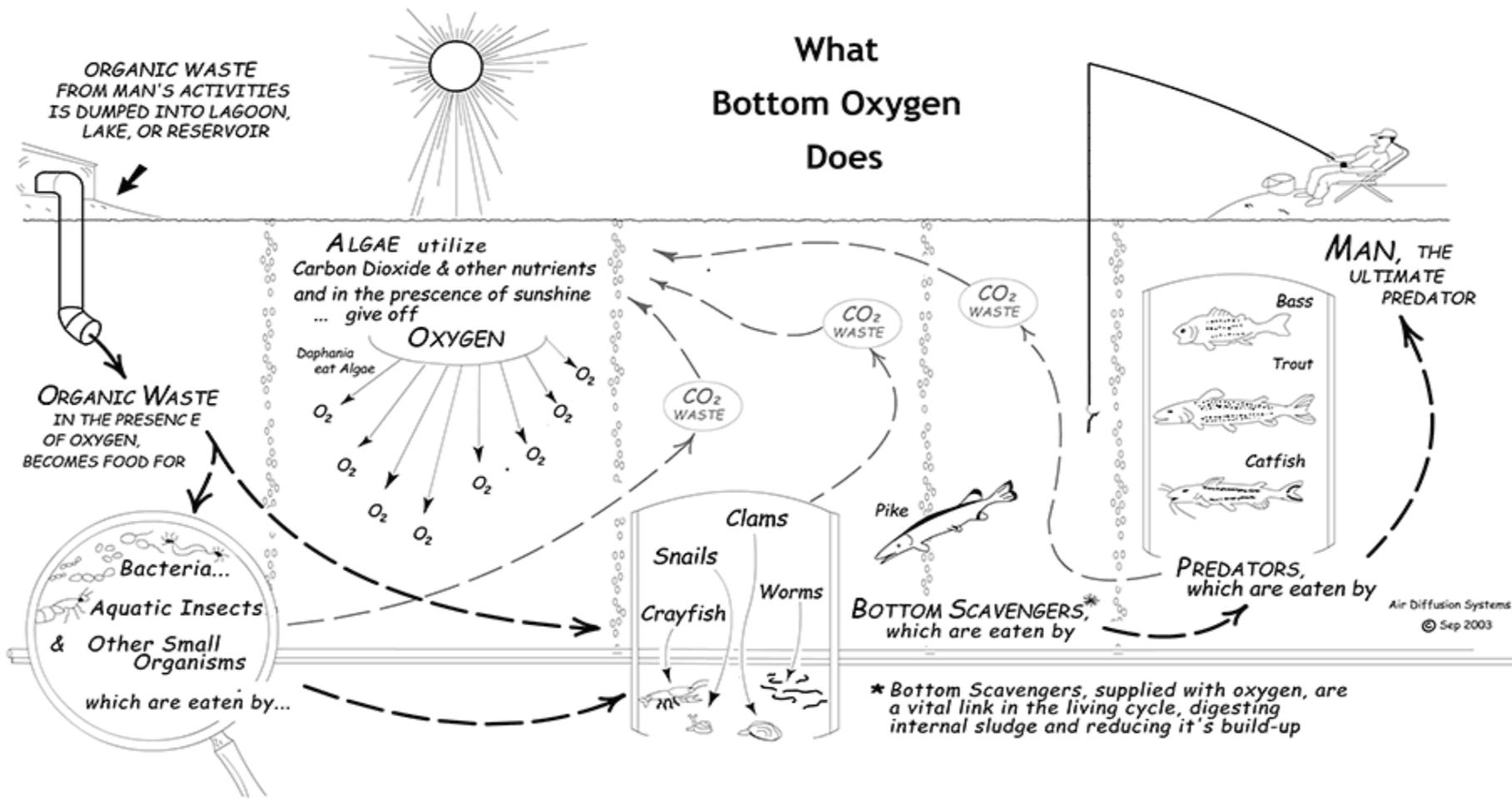


**2025**  
**Sangamon Valley Mahomet, IL**

Three floating HDPE headers and 154 fine bubble diffusers replacing static tube aeration



# What Bottom Oxygen Does



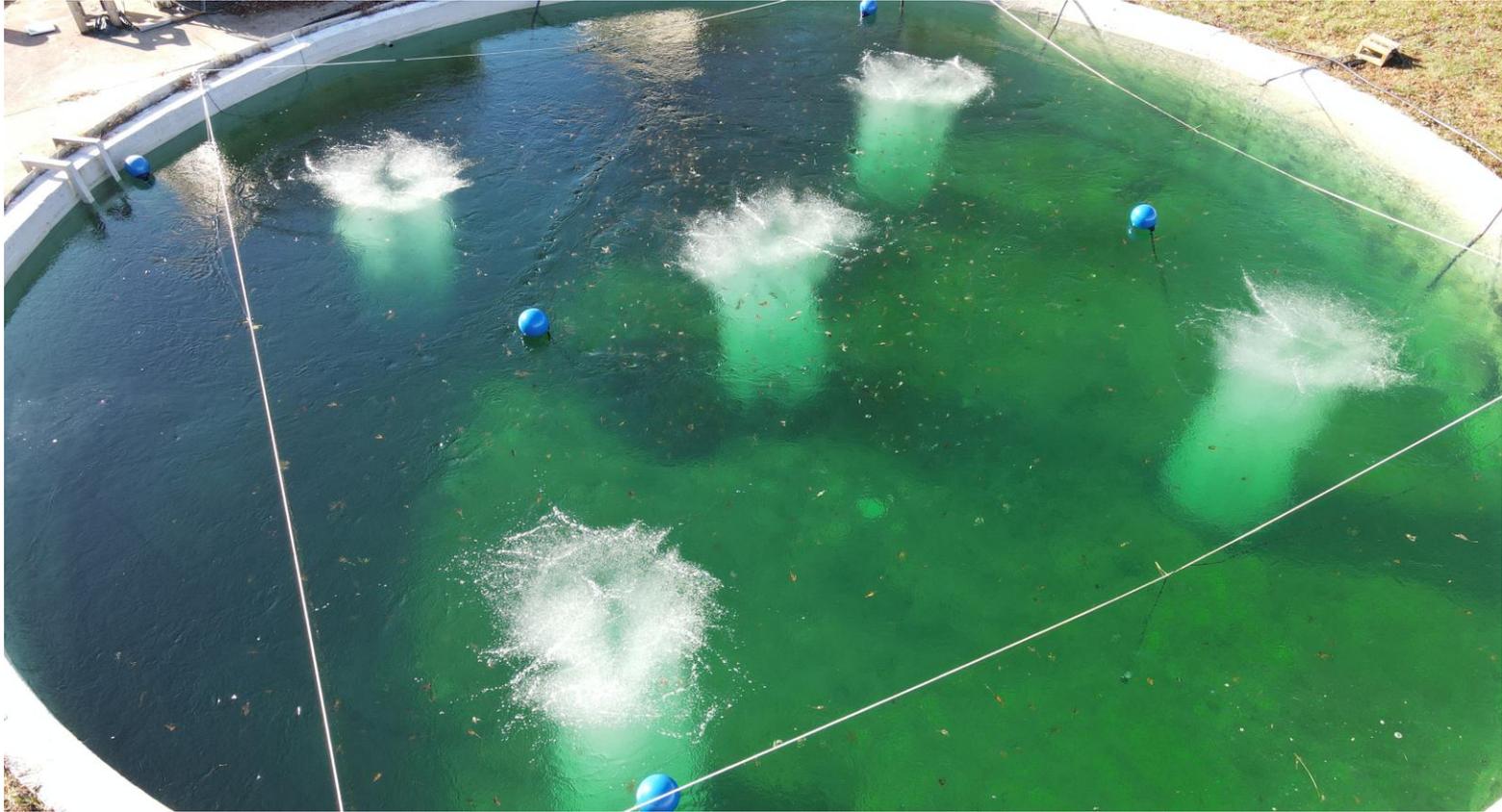
\* Bottom Scavengers, supplied with oxygen, are a vital link in the living cycle, digesting internal sludge and reducing it's build-up

Quiz Time: There is no Bubble Like.....

- A. Large Bubbles
- B. Soap Bubbles
- C. Champagne Bubbles
- D. Fine Bubbles



There is no bubble like FINE BUBBLE!



# Pre-treatment & Sludge

- ⑥ Pre-treatment offers significant cost benefits by keeping inorganics and grit out of the system all together.
- ⑥ Sludge accumulation and removal are extremely important to improving treatment achieved at all WWTF's.
- ⑥ General rule for estimating sludge:
  - ⑥ 1" per year primary
  - ⑥ 1/2" per year secondary & tertiary cells
- ⑥ Sludge can be physically removed and/or reduced using beneficial bacteria.

**INORGANIC SOLIDS...bags, rags, & plastics...will not decompose in the lagoon, and SHOULD be separated!**



**Composite Sampler, Flume, Flow Meter Recorder, & D.O. Probe are essential tools!**



# Measuring Sludge Depth & Solids Concentration in Old Lagoons

Before upgrading any lagoon, make sure to quantify the amount and type of sludge (volatile vs. mineral)

- Sludge Survey the lagoons prior to preliminary design work with a professional service.
- Using a scale lagoon map; mark width & length every 50 to 100 feet on center at the top of water line.
- Mark the same locations on the lagoon bank with contractors' paint or flags.
- A work boat and sludge judge sampler will be required.
- The sample should NOT be taken on a windy day.

# Measuring Sludge Depth & Solids Concentration in Old Lagoons

- Turn-off all aeration for 12 hours prior to testing.
- Using a sludge judge in the vertical position you find the depth of the **TOP SLUDGE LAYER** first.. Then push the judge to the lagoon bottom to record water depth.
- Subtract the water depth from the top of sludge for the estimated sludge depth.
- 6 to 8 sludge samples from each lagoon should be placed into a five-gallon bucket. This sample slurry will be sent to the lab for testing.
- Measure **Dissolved Oxygen** and **Temperature** at multiple lagoon locations and depths.

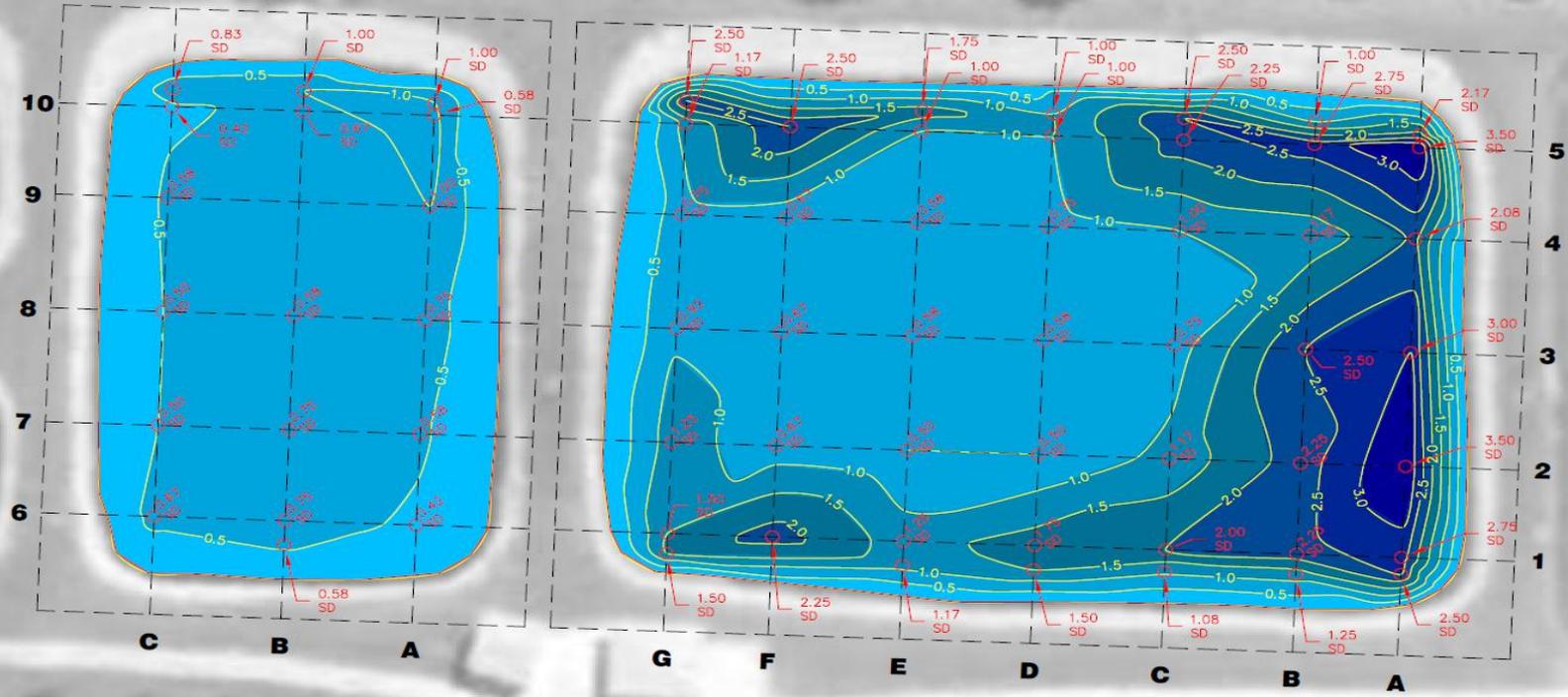
# Sludge Displaces Water

- For every foot of sludge, there is one less foot of water for treatment to occur.
- Sludge accumulation is greatest in the inlet area, corners, & side slopes.





SCALE IN FEET  
0 50 100



**VOLUME = 3,880 C.Y.**  
**783,660 GAL.**

Make sure you know the lagoon water depth



# Physical Removal

- ⑥ A combination of sludge reducing bacteria & physical removal is typically recommended when sludge volume exceeds 20% or more of a basin's volume.
- ⑥ Removal is typically done by sucking the sludge out of the lagoon and transferring it to a textile dewatering bag.
- ⑥ Coagulant(s) are used to separate the solids and allow for ease of dewatering.
- ⑥ Testing should be performed to determine the type and concentration of coagulants.

# Physical Removal Platform



# Textile Bags



## *Lagoon Dredging*

A Lagoon Crawler was used to rake up and remove the sludge. The sludge was then transported and spread into local fields to be used as fertilizer.



*Lagoon Crawler removing sludge*

# Quiz Time:

How big is the plastic island in the pacific ocean?

Take a guess:

The size of Montana?

The size of Texas?

Three times the size of Wyoming?

The size of Alaska?



OMG: 620,000 square miles about the size of Alaska





# **Sludge Removal The Easy Way with ADS**

**A guide for implementing an effective  
sludge management program**

# Record the sludge depth & save for lab testing



# Sludge Sampling



- Contact your preferred testing lab to find out if they can test for sludge volatility (Organic vs Inorganic).
- Other tests to consider: H<sub>2</sub>S, FOG, & Metals.
- Ask for guidance and sampling jars. Pre label each sampling jar with basin number, date, etc.
- Test every basin, and do not mix the sludge. I.E. three basins require three separate 5-gallon buckets.
- Once back on shore, fill each mason jar with 500 ml or more of sludge.
- Prepare the jars for shipping.

## Scan Data

# of Data Points = 497  
Min. Latitude (South) = 41.41  
Max Latitude (North) = 41.41  
N-S Scanned Width (ft) = 164.55  
Avg. Depth Sounding (ft) = 6.76  
Min. Longitude (East) = -89.91  
Max. Longitude (West) = -89.91  
E-W Scanned Length (ft) = 271.95

## Lagoon Data

Actual Waterline Length (ft) = 300  
Actual Waterline Width (ft) = 110  
Waterline to "True" bottom (ft) = 6.8  
Actual Waterline Area (sq ft) = 0  
Side Slope = 3  
Total Lagoon Volume (cu yd) = 6,309.43  
Total Lagoon Volume (cu ft) = 170,354.69

## Results

Average Height of Liquids (ft) = 6.76  
Average Height of Solids (ft) = 2.2  
Volume of Liquids (cu. yd) = 6,272.32  
Volume of Liquids (cu ft) = 169,352.6  
Volume of Solids (cu. yd) = 2,041.29  
Volume of Solids (cu ft) = 55,114.75



## Sonar Sludge Survey

Hire a professional to  
survey your basin(s)



**Scan Data**

# of Data Points = 1,581  
Min. Latitude (South) = 40.21  
Max Latitude (North) = 40.22  
N-S Scanned Width (ft) = 374.64  
Avg. Depth Sounding (ft) = 6.2  
Min. Longitude (East) = -88.38  
Max. Longitude (West) = -88.38  
E-W Scanned Length (ft) = 544.78

**Lagoon Data**

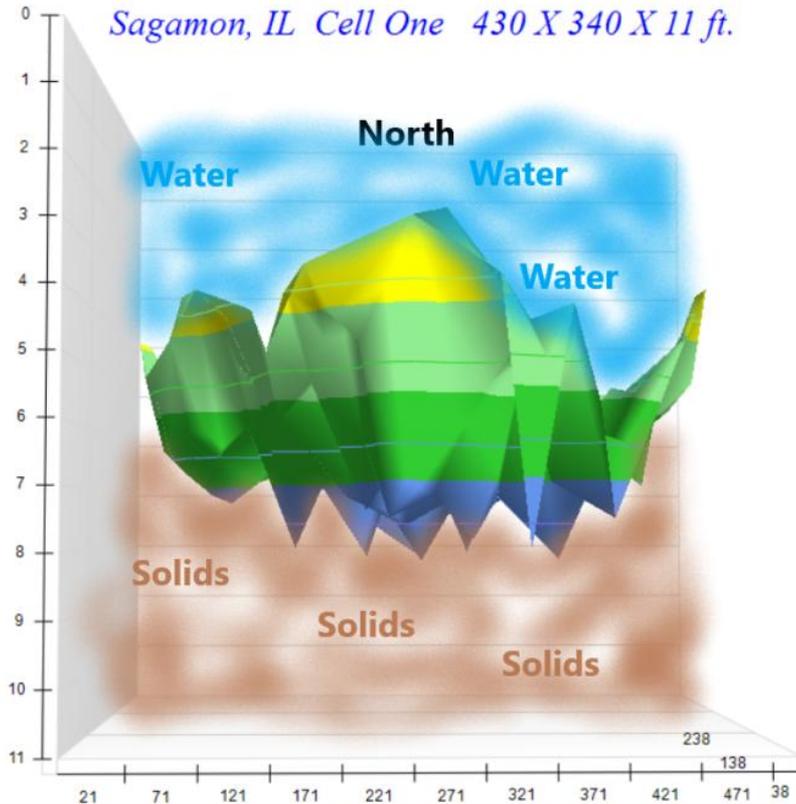
Actual Waterline Length (ft) = 430  
Actual Waterline Width (ft) = 340  
Waterline to "True" bottom (ft) = 6.2  
Actual Waterline Area (sq ft) = 0  
Side Slope = 3  
Total Lagoon Volume (cu yd) = 30,362.54  
Total Lagoon Volume (cu ft) = 819,788.55

**Results**

Average Height of Liquids (ft) = 6.2  
Average Height of Solids (ft) = 4.8  
Volume of Liquids (cu. yd) = 30,362.54  
Volume of Liquids (cu ft) = 819,788.55  
Volume of Solids (cu. yd) = 23,506.48  
Volume of Solids (cu ft) = 634,675.01

**Side View**

*Sagamon, IL Cell One 430 X 340 X 11 ft.*



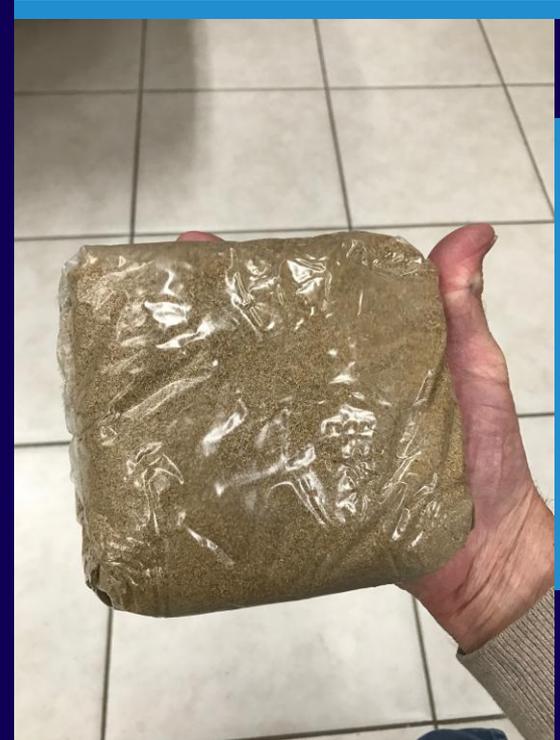
**Water  
Depth  
Scale**

0.00 - 1.38
1.38 - 2.75
2.75 - 4.13
4.13 - 5.50
5.50 - 6.88
6.88 - 8.25
8.25 - 9.63
9.63 - 11.00

**Sonar Technology 3D Imagery**

# Sludge Reducing Bacteria (SRB)

- Specific strains of *Bacillus* bacteria along with the addition of trace nutrients has proven to be a very effective approach for sludge removal.
- Application of Sludge Reducing Bacteria (Bio-augmentation) has proven to be very effective at reducing the organic fraction of sludge during warmer months.
- It is possible to reduce 1” per week during the summer months!





## **ADS Sludge Reducing Bacteria**

**Contains 7 strains of bacillus bacteria that have been chosen based on their ability to work in a variety of conditions.**

**Trace nutrients are added to further improve conditions for new and existing bacteria to convert organics.**

**Packaged as either a powder or a liquid depending on the application and operator preference.**

**Cold weather variants are also available for cooler months.**

**When applied upstream of the WWTP, they will help to pretreat the wastewater and remove FOGS buildup at lift stations and throughout the collection system.**



TRACKER

0286KT

## *Sludge Reducing Bacteria*

ADS' Sludge Reducing Bacteria (SRB) is a non-pathogenic formulation of microorganisms selected for their ability to digest organic matter. The proper application doses of SRB varies for each lagoon system and depends on the age, volume, and flows into the system. At Spring Valley lagoon, SRB is seeded into the bottom areas of thick sludge with an ADS liquid air delivery system. Spring Valley operator Rob Baracani applies the application dose out of a 55- gallon drum weekly during treatment periods. SRB is a highly cost effective and efficient way to reduce unwanted organic matter buildup in lagoon systems. This treatment provided substantial cost savings compared to hauling it away or land application. Additionally, with proper safety data sheets, SRB applications do not require permitting.



55-gallon drum and liquid  
air delivery system



*ADS non-pathogenic SRB  
and workboat*



*SRB is mixed to homogenize  
the solution*

After the first month of sludge reducing bacteria treatment, Spring Valley operator, Rob Baracani, had noticed a change in the water quality of his lagoon. "I wasn't sure how sludge treatment would work with cold temperatures, but we've had no problems." ADS supplies special cold water SRB for lagoon systems where the water temperature dips below 45°F during bacteria treatment.



## *Liquid SRB Delivery System*

In the summer of 2024, the village of Gifford requested ADS implement a liquid SRB delivery system to continue to break down sludge from the wastewater lagoons. In combination with ADS's highly efficient liquid SRB, the system utilizes an automated dosing system that feeds the liquid SRB to the lagoons automatically. In addition to removing the need to manually add SRB packets to the lagoons, the liquid SRB is fed through drip tubes into the manhole where the disk diffusers evenly distribute SRB throughout the lagoon.



*Non-pathogenic SRB combined  
with delivery system*



*AutoDose Automated Dosing  
System*



*SRB delivered to main manhole*

# Mauna Lani Resort, HI - Before



# Mauna Lani Resort, HI - After



# Challenges Faced By Small Communities

- Nutrient limits are becoming more stringent
- Easy to point fingers at WWTP's due to monitoring
- Not so easy to monitor agriculture / runoff
- Many simple, small community systems not able to meet the lower limits due to associated costs

**IT MOSTLY COMES DOWN TO \$\$\$\$**



# AIR DIFFUSION SYSTEMS

## ADS Water & Wastewater Treatment

ADS has established itself as an **Industry Leader** in water & wastewater remediation by integrating. . .

- ✓ **Efficiency:** Highest independently certified oxygen transfer efficiency utilizing the lowest horsepower with improved mixing
- ✓ **Reliability:** 5 year product warranty, most ADS systems are still operating after 20 years.
- ✓ **Effectiveness:** 5 year treatment warranty on all domestic lagoons with effluent discharge limits for BOD & TSS. 5 year treatment warranty on all domestic lagoons with a rock filter and ammonia limit.
- ✓ **Ease of Maintenance:** Only one moving part (the blower), disk modules can be installed and cleaned with minimal effort as the diffuser only weighs ~ 40 lbs.

What is the name of this creature?



# Tardigrade

You can boil them, bake them, deep-freeze them, crush them, dehydrate them, or even blast them into space. It doesn't matter—tardigrades can survive practically anything.

These eight-legged aquatic animals may be small, but they're nearly indestructible.



Besides cleaning up wastewater, I'm recycling plastic waste to make my diffuser frames!



# Questions?



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